SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

Name: Swan Lake **County**: Turner
Legal Description: T97N-R53W-Sec 15-16
Location from nearest town: 3 miles north and 1 mile west of Viborg, SD

Dates of present survey: August 19-20, 2009
Dates of last survey: August 22-23, 2007

Primary Game and Forage Species	Other Species
Walleye	Northern Pike
White Crappie	Black Bullhead
Black Crappie	White Sucker
	Common Carp
	Shorthead Redhorse
	Green Sunfish
	Bigmouth Buffalo
	Channel Catfish
	Yellow Perch

PHYSICAL DATA

Surface area: 208 acres **Watershed area**: 81,913 acres
Maximum depth: 6 feet **Mean depth**: 3 feet
Volume: 719 acre-feet **Shoreline length**: 3.8 miles
Contour map available: Yes **Date mapped**: 1985
OHWM elevation: 1252.9 **Date set**: April, 1983
Outlet elevation: 1252.4 **Date set**: April, 1983
Lake elevation observed during the survey: Full
Benificial use classifications: (5) warmwater semipermanent fish life propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

Swan Lake, a shallow, marginal lake located near the town of Viborg, was so named because it is supposedly shaped like a swan. The lake receives heavy use because of it's proximity to Sioux Falls and the number of people living around it. Throughout history, the lake has been plagued with heavy nutrient and sediment loading from the watershed. Compounding the problem was a poorly-designed water diversion system that directed untreated water from Turkey Ridge Creek into the lake to maintain water levels. From 1992-1998, the diversion was closed, erodable shorelines were rip-rapped and over 400,000 cubic yards of sediment were dredged from the basin. A prolonged period of drought with subsequent declines in lake levels prompted the redesign and construction of a new diversion structure accompanied by an operating plan that only allows diversion of high-quality water in the fall and winter. This new system has restored lake levels.

Ownership of Lake and Adjacent Lakeshore Properties

Swan Lake is listed as a meandered public water in the State of South Dakota Listing of Meandered Lakes. The South Dakota Department of Game, Fish, and Parks (GFP) owns and maintains an access area on the south shore of the lake. The remaining lakeshore property is privately owned and heavily developed.

Fishing Access

The Swan Lake Access Area contains a boat ramp with a dock. The north shore of the lake contains several shore fishing areas.

Field Observations of Water Quality and Aquatic Vegetation

Some cattails (*Typha spp.*) were present along the west shore and small, scattered beds of sago (*Potamageton pectinatus*) were observed. The water was very turbid with a Secchi reading of only 23 cm (9.0 in).

BIOLOGICAL DATA

Methods:

Swan Lake was sampled on August 19-20, 2009 with three overnight gill-net sets and five overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 2.

Results and Discussion:

Gill Net Catch

White crappie (41.2%), and black bullhead (37.4%), were the most common species sampled in the gill nets (Table 1). Other species sampled included common carp, channel catfish, bigmouth buffalo, walleye, white sucker, and yellow perch.

Table 1. Total catch from three overnight gill net sets at Swan Lake, Turner County, August 19-20, 2009.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
White Crappie	54	41.2	18.0	±2.7	0.9	7	5	78
Black Bullhead	49	37.4	16.3	±10.2	19.9	35	0	75
Common Carp	7	5.3	2.3	±1.5	5.1	--	--	--
Channel Catfish	6	4.6	2.0	±1.3	1.6	--	--	--
Bigmouth Buffalo	5	3.8	1.7	±0.4	11.1	--	--	--
Walleye	4	3.1	1.3	±0.9	2.5	--	--	--
White Sucker	4	3.1	1.3	±0.4	0.3	--	--	--
Yellow Perch	2	1.5	0.7	±0.9	23.6	--	--	--

* 6 years (1998, 1999, 2001,2003, 2005, 2007)

Trap Net Catch

Black bullheads (83.5%), and white crappies (11.3%) made up the majority of the trap net sample (Table 2). Other species sampled included black crappie, white sucker, green sunfish, bigmouth buffalo, yellow perch, channel catfish, and common carp.

Table 2. Total catch from five overnight trap net sets at Swan Lake, Turner County, August 19-20, 2009.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	2,697	83.5	539.4	±186.3	59.7	44	0	69
White Crappie	366	11.3	73.2	±46.6	1.5	0	0	92
Black Crappie	62	1.9	12.4	±12.9	3.9	6	0	100
White Sucker	55	1.7	11.0	±4.9	2.9	100	56	85
Green Sunfish	20	0.6	4.0	±2.3	9.7	5	0	93
Bigmouth Buffalo	14	0.4	2.8	±1.6	1.9	57	0	86
Yellow Perch	8	0.2	1.6	±1.3	4.2	--	--	--
Channel Catfish	5	0.2	1.0	±1.0	0.9	--	--	--
Common Carp	2	0.1	0.4	±0.3	3.4	--	--	--

* 6 years (1998, 1999, 2001,2003, 2005, 2007)

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 15.

Only four walleyes 46 to 51 cm (18.1- 20.0 in) were sampled in Swan Lake this year (Table 3). These most likely originated from the 2006 fingerling stocking (Table 4). Large walleye fingerlings (1,080) were stocked in the fall of 2009 since no natural walleye production seems to be occurring in the lake.

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

All Species

Swan Lake has a diverse fish community with 10 species sampled this year (Table 3). CPUE was low for many species. White crappies and black bullheads showed the largest increases, both species are suited for turbid water. Additional fish stocking will be done to further improve game fish and panfish populations.

Table 3. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Swan Lake, Turner County, 2000-2009.

Species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SHG (GN)		--		--		--		--		--
SHG (TN)		--		--		0.2		0.5		--
COC (GN)		4.0		0.3		1.5		2.7		2.3
COC (TN)		1.1		0.6		2.0		4.0		0.4
RIC (GN)		--		--		--		--		--
RIC (TN)		--		0.1		--		--		--
WHS (GN)		0.3		--		--		1.0		1.3
WHS (TN)		1.0		0.4		--		2.3		11.0
BIB (GN)		20.0		23.3		15.0		7.3		1.7
BIB (TN)		3.9		2.6		0.4		2.3		2.8
SHR (GN)		--		--		--		--		--
SHR (TN)		0.1		--		--		--		--
BLB (GN)		16.7		22.0		10.0		6.3		16.3
BLB (TN)		37.3		55.4		14.8		9.8		539.4
CCF (GN)		0.3		1.0		4.5		3.7		2.0
CCF (TN)		0.3		1.6		1.0		0.3		1.0
GSF (GN)		--		--		--		--		--
GSF (TN)		0.3		--		--		1.0		4.0
OSF (GN)		--		--		--		--		--
OSF (TN)		0.9		--		--		--		--
BLG (GN)		--		--		--		--		--
BLG (TN)		--		--		--		0.5		--
WHC (GN)		--		1.3		1.5		2.3		18.0
WHC (TN)		--		--		1.4		7.8		73.2
BLC (GN)		--		--		--		1.0		--
BLC (TN)		--		--		--		22.8		12.4
YEP (GN)		9.0		1.0		0.5		0.3		0.7
YEP (TN)		1.2		--		0.4		0.3		1.6
SXW (GN)		17.3		1.7		--		--		--
SXW (TN)		3.8		4.1		0.4		--		--
WAE (GN)		--		6.7		4.5		4.0		1.3
WAE (TN)		--		3.7		0.4		5.5		--

SHG (Shortnose Gar), COC (Common Carp), RIC (River Carpsucker), WHS (White Sucker), BIB (Bigmouth Buffalo), SHR (Shorthead Redhorse), BLB (Black Bullhead), CCF (Channel Catfish), GSF (Green Sunfish), OSF (Orange-spotted Sunfish), BLG (Bluegill), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), SXW (Saugeye), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor the Swan Lake fishery by conducting biennial netting surveys.

2. Stock walleyes and crappies as needed to achieve and maintain management objectives.

3. Develop an aquatic habitat improvement plan for the lake that may include artificial structures, aquatic plant restoration and rough fish management.

Table 4. Stocking record for Swan Lake, Turner County, 1998-2009.

Year	Number	Species	Size
1998	1,568	Saugeye	Juvenile
1999	165,600	Saugeye	Fry
2000	25,000	Saugeye	Fingerling
2002	25,000	Walleye	Fingerling
	9,196	Yellow Perch	Juvenile
2005	5,984	Walleye	Fingerling
2006	4,892	Black Crappie	Adult
	18,265	Walleye	Fingerling
	3,960	Yellow Perch	Juvenile
2009	1,080	Walleye	Large Fingerling

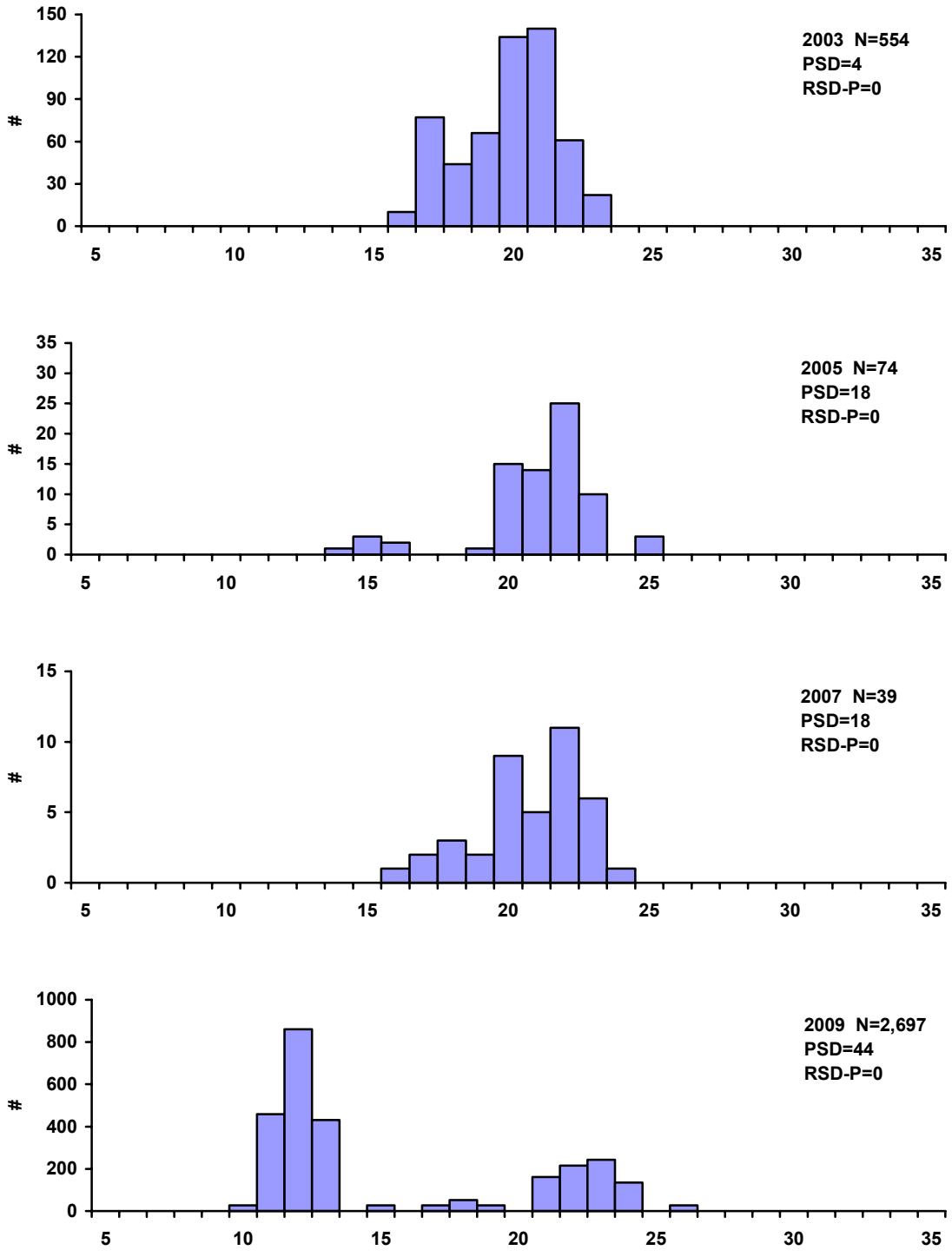

Figure 1. Length frequency histograms for black bullheads sampled with trap nets in Swan Lake, Turner County, 2003, 2005, 2007, and 2009.

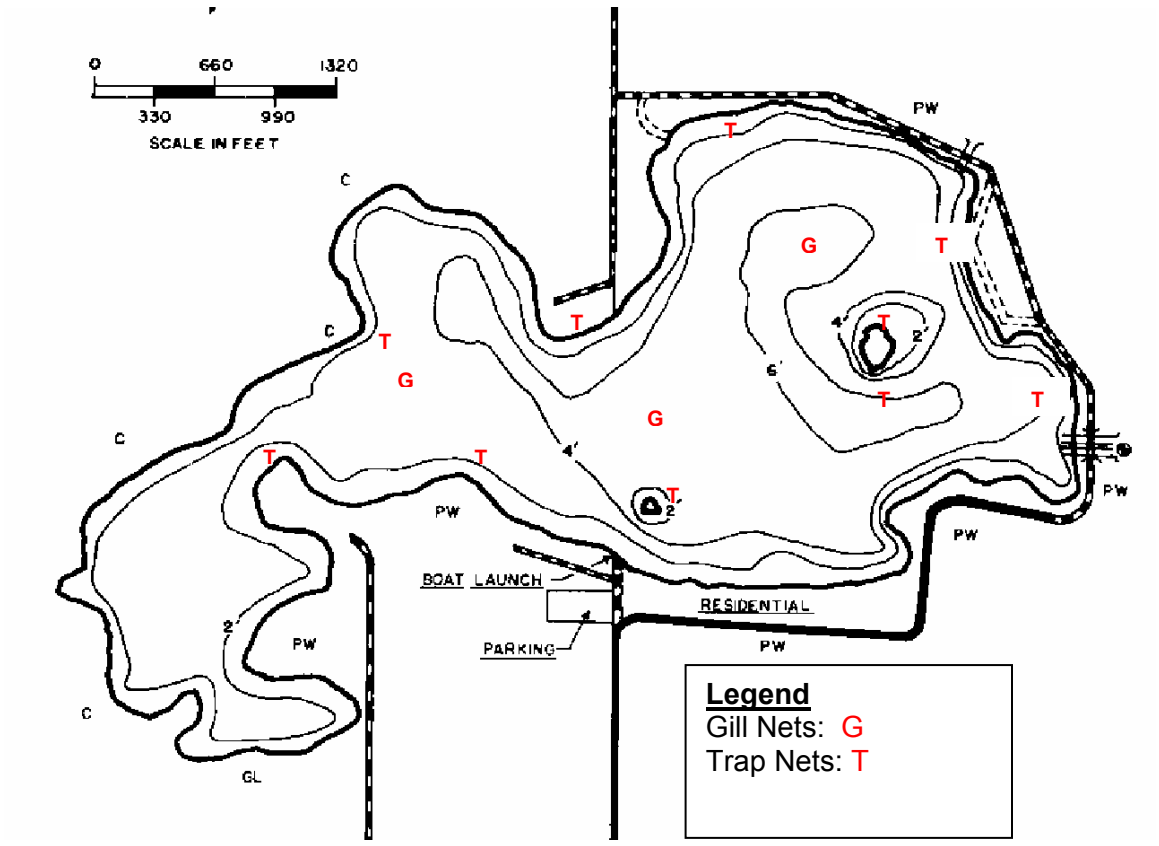

Figure 2. Sampling locations on Swan Lake, Turner County, 2009.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.